

## **4.18 AQUATIC SEDIMENTS**

### **4.18.1 Sediments in the Cooper River and Wando River**

#### **4.18.1.1 Historical Data on Surficial Sediments**

The following discussion is based on information contained in a 1990 report by the South Carolina Wildlife and Marine Resources Department, Marine Resources Division, entitled *A Physical and Ecological Characterization of the Charleston Harbor Estuarine System* (Van Dolah et al., 1990).

Surficial sediments in Charleston Harbor originate from both marine sources and freshwater runoff. The deposition of sediments is controlled by a variety of factors, including riverine flow rates, location of the saltwater wedge, and tidal currents. Changes to the hydrology of the Cooper River and Charleston Harbor that resulted from the diversion and subsequent re-diversion of the Santee River have resulted in changes to the nature of sediments in many portions of the harbor that are still in progress.

#### **Lower Wando River**

Fine to medium sand is the most prevalent bed material in the Wando River. Sampling over a 4-year period from 1984 to 1988 at a station in the midpoint of the river between Daniel Island and Hobcaw Point the bed sediments averaged 70 to 75 percent sand, approximately 20 percent clay, about 5 percent silt, and a small amount of shell hash.

A more intensive survey in July 1988 sampled 18 stations between the south end of Daniel Island and the I-526 bridge. These results indicated that stations near the center of the river were generally comprised of greater than 75 percent sand, while several of those near the shore had a lower percentage of sand (>38 percent) with higher amounts of silt and clay. Sediment at one site near a discharge from the Daniel Island disposal sites was found to be predominantly silt. Above the Wando Terminal, surficial sediments were found to be primarily well-sorted medium sand. The only area of the river exhibiting more than 2 percent organic matter in surficial sediments was that portion below the I-526 bridge.

#### **Lower Cooper River**

Silts and clays characterize the prevalent sediment type in the lower Cooper River. Four-year data for a station in the middle of the Cooper River near the proposed Cooper River berths and the Naval Base indicate that sediments at this location ranged from 0 to 20 percent sand, 10 to 60 percent silt, and 30 to 80 percent clay.

Intensive sampling in 1988 found that stations in the center of the river near the south end of Daniel Island had more than 38 percent silt or clay. Some stations near the Daniel Island shore had more than 38 percent sand while one station near a discharge from the Daniel Island disposal sites had more than 38 percent silt. Three stations just south of the confluence of Clouter Creek with the Cooper River had more than 75 percent sand.

#### **4.18.1.2 Data on Sediment to be Dredged for the Proposed Project**

A project-specific sampling and analysis program has been conducted to assess the acceptability of aquatic sediments to be excavated for the Proposed Project for ocean disposal at the Charleston ODMDS. Similar sampling and analyses have been conducted at the Charleston Naval Base site for use in the comparison of alternatives. The report of this testing program is presented in [Appendix 4.18-1](#).

Eleven stations in Charleston Harbor were sampled as part of this program: three in the proposed Cooper River berthing area, two in the proposed Wando River berthing area, three in the proposed Wando Reach realignment area, and three adjacent to the Charleston Naval Base site. The locations of the samples are shown in [Figure 4.18-1](#). Samples were collected by taking vibracore to an elevation of -47 feet clw, which was done to simulate the mixture of sediments generated by a clambucket dredge. The length of the cores varied between stations due to differences in existing depth, which ranged from 7 to 31 feet. The cores ranged in length from 10 feet to 30 feet. The specific locations and depths of the sampling stations, and the lengths of the cores, are provided in [Table 4.18-1](#).

The results of the grain size analysis of each sample location are presented in [Table 4.18-2](#). All of the stations exhibited a dominance by fine-grained materials. The percentage of silts and clays in each sample ranged from 20.4 percent to 86.7 percent, and averaged 61 percent. The finest materials were found at the former Naval Base site.

[Table 4.18-3](#) presents the results of analyses for metals and other parameters. These results reflect the fact that these are fine-grained materials, but show little contamination or anthropogenic influences. This is expected since the cores contained mostly deep geologic deposits laid down before any human influences on sediment characteristics. [Table 4.18-4](#) presents the results of analyses for polynuclear aromatic hydrocarbons which similarly indicate that these sediments are generally uncontaminated. Analyses for pesticides, PCBs, dioxins, and furans uniformly were below detection limits. All of the bulk sediment chemistry results are presented in [Appendix 4.18-1](#).

#### **4.18.2 Sediments at Charleston ODMDS**

##### **4.18.2.1 Historical Data on Surficial Sediments**

The following discussion is based on information contained in a 1997 report by the South Carolina Wildlife and Marine Resources Department, Marine Resources Research Institute, entitled *An Assessment of Benthic Infaunal Assemblages and Sediments in the Vicinity of the Charleston Ocean Dredged Material Disposal Area* (Van Dolah et al., 1997).

The sediments at most stations sampled in 1993 and 1994 in and around the Charleston ODMDS were comprised of medium to fine-grained sands, mixed with moderate amounts of shell hash. The mean sand content over the 2 years was 82 percent, and the mean CaCo<sub>3</sub> (shell hash) content was 14 percent.

The 1993 sampling found 12 stations near the center of the ODMDS had sediments containing greater than 10 percent mud (silt/clay), with 6 of those containing greater than 45 percent mud. The 1994 sampling found only three stations with more than 10 percent mud, indicating that much of the mud had dispersed. Between

the two years the mean percentage mud in the sediments varied significantly between sample locations. The study results indicated that the mud had apparently been dispersed over a wide area, most likely by the effects of waves and currents.

Trace metal concentrations in the surface sediments were found to be low, generally below published bioeffects levels. No PAH, PCB, or pesticide contaminants were detected in any of the 1993 or 1994 samples. However, it is suspected that higher levels of contaminants may occur periodically following dumping activities since contaminants often bind to the fine-grained sediments such as those typically encountered in maintenance dredging in Charleston Harbor.

#### **4.18.2.2 Project-Generated Data on Reference Stations Near the Charleston ODMS**

A project-specific program of sampling and analysis of surface sediments in the vicinity of the Charleston ODMS has been conducted. This testing was part of the program to assess whether the aquatic sediments proposed to be excavated for the Proposed Project are acceptable for disposal at the ODMS. The data generated by this testing program are included in [Appendix 4.18-1](#).

The locations of the three samples which were combined to generate the reference sediment for testing are presented in [Table 4.18-5](#). Grain size analysis results for this sediment are presented in [Table 4.18-2](#). These sediments were almost entirely fine-grained sand. [Tables 4.18-3 and 4.18-4](#) include results for the reference sediments. Metal levels were low and no PAHs were detected. Analyses for pesticides, PCBs, dioxins, and furans showed very low or non-detectable levels. Complete results for the bulk sediment chemistry analyses are contained in [Appendix 4.18-1](#).